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INTERNATIONAL BUSINESS MACHINES CORPORATION
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EXAMINER

MOORE, KARLA A

| ART UNIT | PAPER NUMBER |
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1763

DATE MAILED: 07/18/2003

7

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/904,424

Applicant(s)

RAFFIN ET AL.

Examiner

Karla Moore

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05/07/03.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 and 15-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 16 is/are allowed.
- 6) ☒ Claim(s) 1-9, 15 and 17-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 July 2001 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-9 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art in view of U.S. Patent No. 6,071,353 to Gallagher, Japanese Patent No. 01-125819 A to Oto et al. and in view of U.S. Patent No. 4,795,880 to Hayes et al.
3. Applicant's admitted prior art discloses the invention, a multi-deposition sub-atmospheric chemical vapor deposition (SACVD) reactor) substantially as claimed and comprising: a substrate processing chamber (Figure 1, 11); a carbon susceptor (Figure 1, 13) adapted to hold a substrate in said substrate processing chamber during a SACVD operation; a gas distribution system (Figure 1, 17) adapted to introduce gases into said substrate processing chamber and including appropriate valves, gas supply lines and other equipment necessary to flow gases into said substrate processing chamber, wherein said gases include dielectric/non-dielectric forming gases and in-situ cleaning gases that are aggressive to carbon; a heating system (Figure 1, 16) to heat said susceptor to an adequate deposition temperature; and a pressurization system (not numbered) adapted to set a pressure level within said substrate processing chamber (page 9, row 6 through page 10, row 4).
4. However, the prior art does not disclose a carbon susceptor adapted to hold a substrate in a substrate processing chamber during a SACVD operation, wherein the carbon susceptor is coated by a polysilicon film to protect it against cleaning gases.

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5. Gallagher discloses a susceptor coated by a polysilicon film and adapted to hold a substrate in a processing chamber during a SACVD operation for the purpose of protecting a processing kit (including the susceptor) during an etching/cleaning process (column 3, rows 12-18).

6. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a carbon susceptor coated with a film of polysilicon in the Applicant's admitted prior art in order to protect the susceptor from damage during an etching/cleaning process as taught by Gallagher.

7. The admitted prior art and Gallagher disclose the invention substantially as claimed and as described above.

8. However, Gallagher fails to teach the coating having different thicknesses on top and bottom.

9. Oto et al. teach a susceptor comprising top and bottom coatings comprising different thicknesses for the purpose of preventing warpage of the susceptor (purpose and constitution).

10. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a susceptor with top and bottom coatings of different thicknesses in Gallagher in order to prevent warpage of the susceptor as taught by Oto et al.

11. Applicant's admitted prior art, Gallagher, and Oto et al. disclose the invention substantially as claimed and as described above.

12. However, the admitted prior art fails to teach a controller coupled to said gas distribution system and pressurization system for directing operation of the SACVD reactor.

13. Hayes et al. teach the use of a controller coupled to a gas distribution system and a pressurization system for the purpose of metering the required amount of selected gases into the reaction furnace reaction tube and maintaining the specified flow and pressure level for a certain period of time (column 2, rows 53-57).

14. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a controller coupled to gas distribution and pressurization systems in the prior

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art in order to meter the required amount of selected gases into the reaction furnace reaction tube and maintain the specified flow and pressure level for a certain period of time as taught by Hayes et al.

15. With respect to limitations drawn to specific gases in claims 1-9, used for specific operations of the claimed apparatus, the courts have ruled that expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining patentability of the apparatus claim. *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969).

16. With respect to claims 7-9 which recite specific processing parameters for a specific operation of the claimed apparatus, the courts have ruled a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ 2d 1647 (Bd. Pat App. & Inter. 1987).

17. The prior art apparatus, in this case the Centura HTF disclosed in the applicant's specification meets all of the structural limitations of the claims and is capable of the pressures, temperatures and flow rates as claimed (see page 9, row 6 through page 10, row 4 and background of the invention).

18. Claims 15 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art in view of U.S. Patent No. 6,071,353 to Gallagher and in view of Japanese Patent No. 01-125819 A to Oto et al.

19. Applicant's admitted prior art discloses the invention, a multi-deposition sub-atmospheric chemical vapor deposition (SACVD) reactor) substantially as claimed and comprising: a substrate processing chamber (Figure 1, 11); and a carbon susceptor (Figure 1, 13) adapted to hold a substrate in said substrate processing chamber during a SACVD operation (page 9, row 6 through page 10, row 4).

20. However, the prior art does not disclose a carbon susceptor adapted to hold a substrate in a substrate processing chamber during a SACVD operation, wherein the carbon susceptor is coated by a polysilicon film to protect it against cleaning gases.

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21. Gallagher discloses a susceptor coated by a polysilicon film and adapted to hold a substrate in a processing chamber during a SACVD operation for the purpose of protecting a processing kit (including the susceptor) during an etching/cleaning process (column 3, rows 12-18).

22. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a carbon susceptor coated with a film of polysilicon in the Applicant's admitted prior art in order to protect the susceptor from damage during an etching/cleaning process as taught by Gallagher.

23. The admitted prior art and Gallagher disclose the invention substantially as claimed and as described above.

24. However, Gallagher fails to teach the coating having different thicknesses on top and bottom.

25. Oto et al. teach a susceptor comprising top and bottom coatings comprising different thicknesses for the purpose of preventing warpage of the susceptor (purpose and constitution).

26. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a susceptor with top and bottom coatings of different thicknesses in Gallagher in order to prevent warpage of the susceptor as taught by Oto et al.

27. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art, Gallagher, Oto et al. and Hayes as applied to claim 1-9 and 18 above, and further in view of Japanese Patent No. 10-041251 A to Hiyamizu (Sony Corp.).

28. The prior art discloses the invention substantially as claimed and as described above.

29. However, the prior art fails to teach said substrate processing chamber having upper and lower volumes separated by a carbon susceptor and said gas distribution system includes first and second gas injection means for respectively injecting gases in the upper and lower volumes of the processing chamber.

30. Hiyamizu disclose the use of a first gas distribution means (Figure 1, 11) in an upper volume of a processing chamber for the purpose of supplying a processing gas and a second gas distribution means

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(Figure 1, 31) in a lower volume of a processing chamber for the purpose of supplying a purge gas and for the purpose of improving manufacturing yield and inhibiting generation of particles during film formation (DERWENT, abstract and advantage).

31. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided first and second distribution means in an upper and lower volume of a processing chamber (respectively) in the prior art in order to improve yield and inhibit generation of particles during film formation as taught by Hiyamizu.

Allowable Subject Matter

32. Claim 16 is allowed.

33. The following is an examiner's statement of reasons for allowance: the prior art fails to teach or fairly suggest a carbon plate coated by a polysilicon coating, wherein said polysilicon coating comprises a bottom silicon coating and a top silicon coating of different thicknesses, wherein the said top silicon coating has a thickness of about 4 μm and said bottom silicon coating has a thickness of about 1.5 μm , wherein the coatings re provided for protecting the susceptor, as well as for allowing determination of susceptor temperature based on emissivity measurements of the coating.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

34. Claim 19 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

35. The following is a statement of reasons for the indication of allowable subject matter: the prior art fails to teach or fairly suggest a carbon plate coated by a polysilicon coating, wherein said polysilicon coating comprises a bottom silicon coating and a top silicon coating of different thicknesses, wherein the said top silicon coating has a thickness of about 4 μm and said bottom silicon coating has a thickness of about 1.5 μm .

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Response to Arguments

36. Applicant's arguments and amendments with respect to claims 1-9, 15, 17-18 and 20 have been considered but are moot in view of the new ground(s) of rejection. Examiner has provided new art which teaches top and bottom coatings on a susceptor with different thicknesses.

Conclusion

37. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karla Moore whose telephone number is 703.305.3142. The examiner can normally be reached on Monday-Friday, 8:30am-5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on 703.308.1633. The fax phone numbers for the organization where this application or proceeding is assigned are 703.872.9310 for regular communications and 703.872.9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703.308.0661.

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July 11, 2003

Primary Examiner
AU 1763
P. Hancock-Judd

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